

CLAIMS

What is claimed is:

1. (Currently Amended) A method for determining ~~[[a]]an inconsistency-defect~~ characteristic of a composite structure, the method comprising:

determining a first distance from a first reference point of the composite structure to ~~[[a]]an inconsistency-defect~~;

determining a second distance from a second reference point of the composite structure to the ~~inconsistency-defect~~;

using the first and second distances to establish a reference area of the composite structure; and

considering each ~~inconsistency-defect~~ detected within the reference area and producing therefrom ~~[[a]]an inconsistency-defect~~ characteristic representative of the composite structure.

2. (Currently Amended) The method of claim 1, wherein considering each ~~inconsistency-defect~~ comprises summing all of the ~~inconsistencies-defects~~ detected within the reference area to produce a total ~~inconsistency-defect~~ count for the reference area.

3. (Currently Amended) The method of claim 2, further comprising dividing the total ~~inconsistency-defect~~ count by the reference area to produce a ~~an inconsistency defect-per-unit area~~ of the reference area.

4. (Currently Amended) The method of claim 3, further comprising comparing the ~~inconsistency-defect-density-per-unit area~~ to a maximum allowable ~~inconsistency-defect-density-per-unit area~~.

5. (Currently Amended) The method of claim 1, wherein considering each ~~inconsistency-defect~~ comprises:

determining a width for each ~~inconsistency-defect~~ detected within the reference area; and

summing the widths of the inconsistencies~~defects~~ within the reference area to produce a width total for the reference area.

6. (Currently Amended) The method of claim 5, further comprising dividing the width total by the reference area to determine a cumulative inconsistency~~defect~~ width-per-unit area of the reference area.

7. (Currently Amended) The method of claim 6, further comprising comparing the cumulative inconsistency~~defect~~ width-per-unit area to a maximum allowable cumulative inconsistency~~defect~~ width-per-unit area.

8. (Currently Amended) The method of claim 5, wherein determining a width for each inconsistency~~defect~~ within the reference area comprises:

selecting, from a digital image of at least a portion of the composite structure including the reference area, a pixel set for each inconsistency~~defect~~ within the reference area representing the width of the corresponding inconsistency~~defect~~;

determining a pixel count for each selected pixel set; and

correlating each of the pixel counts with correlation data to determine the corresponding widths of the inconsistencies~~defects~~ within the reference area.

9. (Original) The method of claim 1, wherein determining a first distance comprises:

determining a linear velocity of a material placement head unit; and

using the linear velocity to determine the first distance.

10. (Currently Amended) The method of claim 9, wherein using the linear velocity comprises:

determining elapsed time between when a course started and when the inconsistency~~defect~~ is detected along the course; and

multiplying the linear velocity by the elapsed time.

11. (Currently Amended) The method of claim 9, wherein using the linear velocity comprises:

determining elapsed time between when a first inconsistency-~~defect~~ is detected along a course and when a second inconsistency-~~defect~~ is detected along the course; and

multiplying the linear velocity by the elapsed time.

12. (Original) The method of claim 9, wherein determining a linear velocity comprises:

determining an angular velocity of a compaction roller of the material placement head unit; and

multiplying the angular velocity by a circumference of the compaction roller.

13. (Original) The method of claim 12, wherein determining an angular velocity comprises detecting, counting, and establishing frequency of transitions between contrasting portions of a code ring coupled for common rotation with the compaction roller.

14. (Currently Amended) The method of claim 1, wherein determining a first distance comprises:

counting revolutions of a compaction roller from course start to detection of the inconsistency-~~defect~~; and

multiplying the counted revolutions by a circumference of the compaction roller.

15. (Currently Amended) The method of claim 14, wherein counting revolutions comprises detecting and counting transitions between contrasting portions of a code ring coupled for common rotation with the compaction roller.

16. (Original) The method of claim 1, wherein determining a second distance comprises:

summing courses completed to produce a total completed course count;
and

multiplying a predetermined course width by the total completed course count.

17. (Original) The method of claim 16, wherein summing completed courses comprises tracking receipt of signals from a machine load cell indicating whether pressure is being applied to a compaction roller.

18. (Original) The method of claim 1, wherein determining the second distance comprises:

selecting, from a digital image of at least a portion of the composite structure including the second distance, a pixel set representing the second distance;

determining a pixel count for the pixel set; and

correlating the pixel count with correlation data to determine the second distance.

19. (Original) The method of claim 1, wherein the reference area comprises a region of the composite structure bounded by the first and second distances.

20. (Original) The method of claim 1, wherein the reference area comprises a region of the composite structure bounded by predetermined linear and lateral distances.

21. (Currently Amended) The method of claim 1, further comprising implementing a user interface for displaying inconsistency-defect data and for allowing at least one user input.

22. (Original) The method of claim 1, further comprising:
importing a part model of a composite structure;
overlaying a course grid on the part model; and
displaying to a user the part model and course grid.
23. (Original) The method of claim 22, further comprising:
repositioning the course grid overlay when a new ply is started; and
displaying to a user the part model and the repositioned course grid overlay.
24. (Currently Amended) The method of claim 1, further comprising:
communicating with an inspection system inspecting the composite structure for inconsistencies~~defects~~.
25. (Currently Amended) A method for determining ~~[[a]]an inconsistency-defect~~ characteristic of a composite structure, the method comprising:
determining a linear velocity of a material placement head unit along a course being laid;

using the linear velocity to determine a linear distance from a first reference point along the course to ~~[[a]]an inconsistency-defect~~ of the composite structure; and

determining a lateral distance from a second reference point of the composite structure to the inconsistency~~defect~~.
26. (Original) The method of claim 25, wherein determining a linear velocity comprises monitoring revolutions of a compaction roller of the material placement head unit.
27. (Original) The method of claim 25, wherein determining a linear velocity comprises:

determining an angular velocity of a compaction roller of the material placement head unit; and

multiplying the angular velocity by a circumference of the compaction roller.

28. (Original) The method of claim 27, wherein determining an angular velocity comprises detecting, counting, and establishing frequency of transitions between contrasting portions of a code ring coupled for common rotation with the compaction roller.

29. (Original) The method of claim 25, wherein determining a lateral distance comprises:

summing courses completed to produce a total completed course count; and
multiplying a predetermined course width by the total completed course count.

30. (Original) The method of claim 29, wherein summing completed courses comprises tracking receipt of signals from a machine load cell indicating whether pressure is being applied to a compaction roller of the material placement head unit.

31. (Original) The method of claim 25, wherein determining a lateral distance comprises:

selecting, from a digital image of at least a portion of the composite structure including the lateral distance, a pixel set representing the lateral distance;
determining a pixel count for the pixel set; and
correlating the pixel count with correlation data to determine the lateral distance.

32. (Currently Amended) A method for determining [[a]]an inconsistency-defect characteristic of a composite structure, the method comprising:

determining a linear velocity of a material placement head unit along a course being laid by monitoring revolutions of a compaction roller of the material placement head unit;

using the linear velocity to determine a linear distance from a first reference point along the course to ~~[[a]]an inconsistency-defect~~ of the composite structure;

determining a lateral distance from a second reference point of the composite structure to the ~~inconsistency-defect~~;

using the linear and lateral distances to establish a reference area; and

summing ~~inconsistencies-defects~~ within the reference area to produce a total ~~inconsistency-defect~~-count for the reference area.

33. (Currently Amended) The method of claim 32, further comprising dividing the total ~~inconsistency-defect~~-count by the reference area to determine ~~[[a]]an inconsistency-defect~~ density-per-unit area of the reference area.

34. (Original) The method of claim 32, wherein monitoring revolutions of a compaction roller comprises detecting, counting, and establishing frequency of transitions between contrasting portions of a code ring coupled for common rotation with the compaction roller.

35. (Currently Amended) A method for determining ~~[[a]]an inconsistency-defect~~ characteristic of a composite structure, the method comprising:

determining a linear velocity of a material placement head unit along a course being laid by monitoring revolutions of a compaction roller of the material placement head unit;

using the linear velocity to determine a linear distance from a first reference point along the course to ~~[[a]]an inconsistency-defect~~ of the composite structure;

determining a lateral distance from a second reference point of the composite structure to the ~~inconsistency-defect~~;

using the linear and lateral distances to establish a reference area;

determining a width for each ~~inconsistency-defect~~ within the reference area; and

summing the widths of the inconsistencies~~defects~~ within the reference area to produce a width total.

36. (Currently Amended) The method of claim 35, further comprising dividing the width total by the reference area to determine a cumulative inconsistency~~defect~~-width-per-unit area of the reference area.

37. (Original) The method of claim 35, wherein monitoring revolutions of a compaction roller comprises detecting, counting, and establishing frequency of transitions between contrasting portions of a code ring coupled for common rotation with the compaction roller.